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Terms of Reference

Home Composting

Project:

Business Cases for Improved Waste Collection and Valorization

Apply Home Composting
in Your Municipality

October 2019

SeSWA Serbian Solid Waste Association

NALAS

CONTENTS

1 INTRODUCTION

Composting is the process of biological degradation of organic materials which, with the help of microorganisms in the presence of oxygen and under controlled conditions (particular temperature and humidity), generates compost, a stable material similar to humus. During the process of composting, biodegradable waste is stabilized (wet and solid organic material, food waste, garden waste, paper, cardboard, etc.) and generates the product — compost. **Home composting or backyard composting** refers to the self-composting of biowaste, as well as to the use of compost in gardens belonging to the public and to private entities. As such, home composting brings additional benefits when compared to the industrial process: it avoids the organized collection of the organic fraction from municipal solid waste; considerably reduces the economic, material and energy investments; and finally, allows for direct control of the process and the organic materials input by avoiding or reducing the inclusion of impurities. This low-cost solution is a unique waste management option, because the waste producer is also the processor and end-user of the product. However, home composting should be carefully organized. The compost obtained is often not homogeneous; odors and other pollutants such as methane, ammonia or nitrous oxide are emitted directly to the atmosphere during the decomposition process, if not properly managed. Hence, it is of outmost importance to provide easily accessible advisory support and know-how to municipalities and municipal utility companies, in order to avoid any potential errors in the implementation and operation of home composting.

With appropriate support, home composting can be efficiently integrated and socially accepted. In this regard, home composting is a low-cost solution that has the potential to contribute to the biodegradable waste diversion and at the same time lower the cost of systematic centralized waste treatments. Introduction of home composting in municipalities can quickly support the efficiency of biodegradable waste management and provide revenues to municipal utilities through savings in waste collection, transport and centralized local or regional treatment of biodegradable waste generated by individual households.

The Landfill Directive (1999/31/EC) obliges Member States to reduce the amount of biodegradable municipal waste that they landfill to 35% of the 1995 levels by 2016 in some and by 2020 in other countries

In the course of their EU accession process, the Western Balkan countries will also have to reduce the amount of biodegradable municipal waste that they landfill to 35% of the 2008 levels until the moment they join the Union or by a specific negotiated date.

Since the landfill directive came into force in 1999 (CEC, 1999), the organic fraction of waste going to landfills in the European Union has been diverted to other treatment facilities, such as composting plants. This has generated a greater need for well-managed composting plants or the possibility of avoiding organic waste in municipal waste streams by composting at home. For example, the Landfill Ordinance in Serbia prohibits direct landfilling of biodegradable waste, in line with the EU landfill directive. The strategic priority is the diversion of biowaste fractions; however, not much success has been accomplished up to now and no treatment capacities have been implemented/constructed. Like centralized composting, home composting has some advantages, such as the production of a nutrient-rich humus-like material for use on soil as a substitute for fertilizers and/or for peat in growth media. When composting organic waste in private gardens, less waste goes to centralized composting (or other treatment facilities), thereby allowing for municipalities and public utility companies to generate savings related to the collection, transportation and treatment of generated waste.

The German Development Cooperation implemented by Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) aims to support local authorities and public utility companies in the provision of better and higher-quality waste management services in Southeast Europe through the Open Regional Fund – Modernization of Municipal Services (ORF MMS) project.

In this context, the Business Cases for Improved Waste Collection and Valorization Project, with the partner projects GIZ Climate Sensitive waste Management (DKTI) in Serbia and GIZ Sustainable Municipal Services (SMS) in Kosovo, as well as with the partner organizations Network of Associations of Local Authorities in SEE (NALAS) and Serbian Solid Waste Association (SeSWA), developed a methodological approach (Terms of Reference - ToR) for the introduction/optimization of five (5) business processes:

- optimization of routes,
- **home composting,**
- cost centers,
- health & safety, and
- customer base.

As one of the business processes piloted, home composting was piloted in the city of Kikinda and the municipality Bachki Petrovac in Serbia, and in Zenica in Bosnia and Herzegovina.

The purpose of this document is to describe the methodological steps for application of the home composting process in households, which can be implemented either by the local self-governments and their public utility companies if they possess sufficient internal capacities and expertise or through outsourcing it to advisory services specialized in this kind of tasks. In this respect, what needs to be considered is the process complexity and the fact that its implementation requires knowledge. In the case of outsourcing, the documents contents and structure provide good understanding of the process, the activities required and the outputs expected from the advisor, thus allowing for easy derivation of the service terms of reference.

2 OBJECTIVE

The objective of these TOR is to provide guidelines for the implementation of home composting and thus achieving savings for the households and the Public Utility Company (PUC) involved, reduction of communal waste ending up on the landfill and overall positive impact on the local environment.

3 BENEFITS OF INTRODUCTION OF HOME COMPOSTING

When done properly, home composting can yield a number of benefits, not only to households that practice it, but to the PUC/local authority and the environment as well.

The benefits for the household include lower waste collection bills as a result of reduced waste that needs to be collected; and free of charge natural soil fertilizer for gardens, flowers or lawns.

The benefits for the PUC include fewer costly collection runs to usually dislocated rural settlements, and reduced pressure to the landfill by the biodegradable waste. The benefits for the local authority can be seen in the need of smaller investments in a central composting plant or other treatment options.

The benefits for citizens (i.e. farmers) is that the compost aids to land fertility and minimizes the utilization of artificial fertilizers. The benefits to the environment could be seen in reduced methane emissions from landfills.

4 PROVISION OF ADVISORY SERVICES FOR HOME COMPOSTING – METHODOLOGICAL APPROACH

In order to properly introduce home composting solutions as a support to biodegradable waste diversion from landfills, municipalities and their utility companies should be advised and guided to perform the following activities.

4.1 Preparatory Activities

For the effects and benefits of home composting to be demonstrated in their full potential, the scope of this intervention must be large and concentrated, but not limited to several households or scattered around the municipal territory. To achieve that, awareness and will of the decision makers at local government and PUC level are required. Furthermore, such an approach must be well communicated to the local population, so that a greater number of households would be interested to participate in a large-scale home composting initiative.

Political support is best obtained through direct contact with decision makers and should be ideally documented and provided in the form of a letter of interest signed by the mayor and/or a decision of the PUC Director. Such a letter or decision should clearly state the division of responsibilities and obligations between the PUC, local authority and citizens that are going to be participating in the process. The elements of the letter or decision should come out as result of discussions and meetings with the company and municipal leadership and should be drafted after these meetings, containing but not limited to elements such as establishment of the H&S processes working group, and identifying the working group members, the person responsible for the process in the company, the time frame etc.

4.1.1 *Meeting with the Municipality and the Public Utility Company (PUC)*

The meeting should be attended by the decision makers and technical teams from both the municipal administration and the utility company. The purpose of the meeting is to present the advisory service and the process to be implemented in the municipality and to inform the latter about the steps and activities to be implemented, including the activities to be performed by the municipal team. Attendances should be defined by the municipality and the PUC. The meeting should also initiate the setting up of a process implementation working group and identify the necessary initial information (such as the waste generation rate, biowaste generation, amount of waste collected, structure of households, and number of households that would potentially implement the process).

4.1.2 *Setting up the Working Group*

The municipality establishes a working group based on the given inputs. The working group should consist of at least one representative of the municipality (Environmental Department), the PUC (waste management department) and an NGO, if there is one that is active in a given municipality. The main tasks of the working group are to organize and follow the implementation of the process. The person in charge will be an external or internal expert in this field, but usually the PUC manager in charge.

The working group should meet regularly and one of its first tasks should be to come out with an Action Plan (AP) for the implementation of the Home Composting process. A very important task of the working group is to agree upon and approve the recommendations coming from the advisor, as well as to maintain the regular communication between the group and the decision makers.

4.1.3 *Development of an Action Plan (AP) for Implementation of the Home Composting Process*

The AP should include the time frame, responsible persons, necessary steps and coordination between different actors, as well as the resources required for the implementation of the process. This action plan should include timelines and dates for all the necessary activities. In addition, the action plan should consider other municipal waste management plans and actions if they are applicable and exist in the given municipality. It is developed by the working group, with support from the advisor.

4.2 Data Collection on the Existing Composting Planning Framework and Potential Beneficiaries

4.2.1 *Data Collection and Baseline Definition*

The advisor should define the data and information necessary for the project preparation, implementation and follow up activities. It is necessary that the municipality/PUC performs the measurements and have data on municipal solid waste (MSW) generation and composting as defined by the national methodologies. These data can be found in local waste management plans, which are a legal obligation of the municipalities.

Still, in cases when the data is obsolete or do not exist, the municipality/PUC must as a precondition perform measurements, using waste the generation and composition methodology according to either the national laws, if applicable, or the one presented in the NALAS document "Good Practices of Waste Quantity and Morphology Determination in the Region of Southeast Europe"[1].

The data collected should also be used in drafting the baseline against which the progress of the process will be measured. To measure the progress in terms of reduced amounts of biodegradable waste going to the landfill, data concerning the quantities and morphology of disposed waste should be acquired and monitored. This kind of data should be found in the PUC or landfill operator reports.

4.2.2 *Review of the Existing Home Composting Supporting Programs and Definition of the Most Appropriate Local Policy*

This task will summarize the potential policy and programs that can/will support the home composting operation (e.g. selling compost to third parties, the potential, exemption from payment of one-month collection service, small awards, incentives, etc.). This is an important task, since it can substantially determine the further activities in terms of the area or number of future users of home composters.

4.2.3 *Defining the Area and Households for Introduction of Home Composting*

This task should define the geographical distribution and number of households for introduction of home composting. A one-street or random households model can be applied, depending on the specific local conditions in a given municipality (possible template for small survey: https://docs.google.com/forms/d/e/1FAIpQLSdBo8WgIuV5wnJc7lK3Yq5KFZcAmkii8H_3ZRfG5F8whOMEDw/viewform?c=0&w=1). Still, in order to maximize the effects of home composting to the PUC operations, a concentrated approach is recommended. This task should be supported by the advisor.

At this stage, a preliminary decision should be adopted on the number of home composters, households and their location, since these are critical inputs for the later stages of the process implementation. The

[1] http://www.nalas.eu/Publications/Books/SW_practices

advisor should come up with the proposal and the working group should discuss it and, if necessary, comment on and amend and finally endorse it.

4.3 Communication with Citizens and Promotional Activities

The communication and promotional activities must start early in the process and be continuously conducted throughout all phases of implementation and use of home composters. In the early stages, the engagement of representatives of citizens or NGOs in the working group is sufficient, but in the later stages and especially when deciding which households will be included in the project, these activities need to be well and timely prepared and appropriately implemented.

The promotional activities should be developed by the working group, with active involvement of the municipality and PUC and with support from the advisor. The local campaign is to be implemented by the PUC. The campaign should include workshops open to public participation, flyers, discussions with PUC representatives, promo posters in municipality centers, and announcement of home composting initiatives through local media.

4.4 Provision of Home Composting Equipment

The advisor should make a specification of the equipment. The specification must in particular contain the number, volume, and price of proposed home composters. Hence, the following issues must be covered:

- Development of a detailed specification for the equipment necessary for home composting (done by the advisor)
- Tender procedures for home composters (done by the PUC)
- Purchase of the equipment (done by the PUC)

4.5 Introduction of Home Composting to Selected Households

4.5.1 *Delivery of the Equipment*

Based on the preliminary proposal on the number and distribution of home composters, the equipment will be delivered following two possible models: on a voluntary basis (based on expressed interest) or to a selected sample of households. Depending on the local conditions in the specific municipality, one or the other model will be chosen for the program and the equipment will be delivered accordingly. In any case, the interest and willingness to participate is the key element for the further implementation and overall success of the project. In case the second approach is chosen, households will be selected based on the availability of space for home composting in their backyards, the green area, the number of people in the household, etc.

To determine the interest and readiness for participation in the home composting project, an example of the questionnaire for citizens is provided in an annex to this document (chapter 9).

4.5.2 *Trainings for End Users of Home Composters*

Two trainings should be envisaged for home composter users. First of all, training or a workshop should be organized before the delivery of equipment, to educate the target audience about the usage and benefits of composting. In addition to this, it can also include the launch and promotion of the start of home composting. The second training will focus on the installation of home composters and a trial

period of operation, as well as on practical issues of the composting process and the subsequent use of the material obtained by the process.

Delegated persons from the PUC should participate in the trainings. A brochure and/or leaflets (https://bfpe.org/wp-content/uploads/2017/04/GIZ_IMPACT_FLAJER_A4na3-Composting-ENG.pdf) with a practical manual should be provided to the users. Training could also be delivered to school children, to ensure sustainability.

4.5.3 *Organization of On-site Support to Households*

On-site support should be available after the installation of home composters. Also, a direct telephone number to the PUC should be introduced, with the specific goal of supporting every citizen facing any issues with the home composing process and its management. Field support would be requested and provided by the PUC via such a line. In addition, citizens who would like to participate in the home composting program in the future will be able to request home composters as well.

5 ACTION PLAN IMPLEMENTATION (INTRODUCTION) OF ADVISORY SERVICE

Activity	Time frame																								Responsible
	Month 1				*Month 2*				*Month 3*				*Month 4*				*Month 5*				*Month 6*				
	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	
1. Preparatory activities																									
1.1 Meeting with the municipality and Public Utility Company																									Advisor
1.2 Setting up the Working Group																									Municipal administration
1.3 Development of an action plan for implementation of the home composting process																									Working group/Advisor
2. Data collection within the existing composting planning framework and potential beneficiaries																									
2.1 Data collection and defining a baseline																									Working group/Advisor
2.2 Review of the existing programs which support home composting and definition of the most appropriate local policy																									Working group/Advisor
2.3 Defining the area and households for introduction of home composting																									Working group/Advisor
3. Implementation of promotional activities targeting citizens																									
																									Municipal Administration/Working group/Advisor
4. Provision of the home composting equipment																									

																								Municipal Administration/Working group/Advisor
5. Introduction of home composting to selected households																								
5.1 Delivery of the equipment																								Working group/Municipal Administration
5.2 Trainings for end users of home composters																								Working group/Advisor
5.3 Organization of on-site support of households																								Working group/Municipal Administration

6 KEY DELIVERABLES AND INPUTS BY ADVISOR

For the implementation of the advisory service and the above given tasks, it is necessary to set up the team of two advisors with the profile as given in Section 8 of these ToR.

The key deliverables and inputs to be provided by the advisor for each stage of the service implementation are as follows:

Key tasks and deliverables of Advisor	Number[2] of days needed per advisor
1. Preparatory activity	**Up to 3 days**
1.1 Meeting with the municipality and Public Utility Company	Up to 1 day
1.2 Setting up the Working Group	Up to 1 day
1.3 Development of an action plan for implementation of the home composting process	Up to 1 day
2. Data collection within existing composting planning framework and potential beneficiaries	**Up to 7 days**
2.1 Data collection and defining a baseline	Up to 3 days
2.2 Review of the existing programs which support home composting and definition of THE most appropriate local policy	Up to 2 days
2.3 Defining the area and households for introduction of home composting	Up to 2 days
3. Implementation of promotional activities targeting citizens	**Up to 5 days**
4. Provision of the home composting equipment	**Up to 2 days**
5. Introduction of home composting to selected households:	**Up to 12 days**
5.1 Delivery of the equipment	Up to 5 days
5.2 Trainings for end users of home composters	Up to 2 days
5.3 Organization of on-site support for households	Up to 5 days

[2] Number of working days for advisor may vary and depends on different factors (specific needs for support of local government etc.)

7 SETTING UP THE METHOD AND MONITORING THE FINANCIAL BENEFITS

The process progress monitoring model focuses primarily on changes related to biodegradable waste management, with an emphasis on the expected reduction of direct costs, as the key effect for the final evaluation of the results of the home composting process. In addition, the model and methodology related to the monitoring of results of the home composting allow for approximation of the benefits expected, i.e. reduction of the amounts of municipal waste disposed of and the costs of disposal that would result from the development of the home composting process in the said municipalities.

The first 6 months of process implementation were taken as the time frame (testing period) over which progress will be monitored. As needed or in accordance with the composting process itself, this period can be extended to the months to follow. The key data for monitoring the home composting process were developed in the form of an excel table (Annex 2):

Table1- Enterprise-level data available to users, quantifying indicators of the total generated and total collected municipal waste, waste morphology or percentage of biodegradable waste suitable for composting, municipal waste collection and transportation costs, and disposal costs.

Table 2- Monitoring during which the beneficiary of the project, i.e. the local utility company follows changes that occur in the 2nd and 6th months from the beginning of implementation. The specificity of such monitoring is consistent with the expected effects of the composting process itself. By monitoring the estimation of the volume of biodegradable waste selectively separated in the composters and the volume of the compost produced, the proposed model provides an approximation of the total scope of the home composting process in the territory of operation of the local enterprise. The established monitoring also includes following such changes through the involvement of the fleet and the costs related to their involvement in the municipality/city where the project is being implemented, with the aim of quantifying the potential reduction of direct costs by introducing a process in the territory where the local enterprise operates.

Table 3 – The process monitoring includes a set of indicators that show the business performances achieved as a result of the process implemented. For organizational purposes, the key process performance indicators are established as two subsets of data: changes related to biodegradable waste management and recorded direct costs as an effect of home composting.

In order to do the monitoring properly, it is also important to appoint a responsible person from the local self-government to monitor and deliver data on a monthly basis.

7.1. Case Studies

7.1.1. Practical Implementation and Results of Home Composting in the City of Kikinda

The city of Kikinda in Serbia was one of the local self-governments that applied and was selected for piloting the Home Composting process under the "Business Cases for Improved Waste Collection and Valorization" project. By applying for the piloting, the city of Kikinda clearly expressed its commitment and political will to implement the process. SeSWA (Serbian Solid Waste Association), as a partner organization of the Project, delegated a solid waste management expert (advisor) to guide the municipality through the process.

According to the collected and elaborated information on waste generation, waste composition and housing structure in Kikinda, as well as to the implementation plan defined, it was proposed that 110 home composters be purchased and delivered to individual households, with the support of the Utility Company (FCC Kikinda), the city waste operator. As a preparatory/training activity, each household

received a home composting manual. In addition, a public event announcing and introducing home composting to the general public was organized. Several companies that have the capacity to produce home composters in line with a previously developed specification were identified and the optimal one was chosen (mainly local carpenters). At the official opening event for the introduction of home composters to Kikinda households, several presentations were delivered about the overall project, the bio-waste treatment, and the home composting process and its implementation in Kikinda.

One of the lessons learned in Kikinda was that the distribution of composters would have been easier for the utility company if the households selected had been in the same streets. This also impacts the savings in monitoring home composting, on-site support, etc.

Monitoring and Evaluation

The six-month's monitoring results in the city of Kikinda in 2019 clearly indicate that the households involved in the process were very serious when it came to doing primary selection of waste intended for composting. The monitoring was done over a relatively low number of composters, due to the large spatial distances between the composters installed and the limited ability of the competent institutions in charge of environmental issues involved in the process to be additionally engaged as a result of the large scope of regular duties they are responsible for. The high percentage of 130% in the second reading was the consequence of the intensive selection during the summer period, when high garden waste amounts are generated and the home composters were in fact overfull. What was also typical was the fact that, based on the information provided, a certain amount of compost has already been produced and reported by the households, but were not quantified at this stage. According to the data provided for the period, it may be concluded that 1.9% (52 tons) of biodegradable waste was redirected to home composting as compared to the generated amount of waste that could have been redirected to home composting over the six months observed. The key indicators, which included the direct costs of collection and transport of waste and the costs of disposal at the regional landfill, point to savings made in the amount of 1.88% of the stated real costs in the six-month period.

Based on the data provided, the city of Kikinda possesses great potential in terms of the number of households into which the introduction of home composting would be justified, establishing that the number of households into which it is justifiable to introduce the process amounts to 22,581, which accounts for 88% of the total number of households on the territory of the city. At an annual level, the above stated direct costs of collection and disposal of waste that may be redirected to home composting amount to EUR 80,756, which is a direct indicator of the fact that further and complete implementation of the process may result in operational savings in this amount. It is worth noting that the amounts of current annual costs analyzed, based on the 2018 pricelist of FCC d.o.o., show costs somewhat lower than the anticipated ones, having in mind that the company manages the regional waste management center. One has to also have in mind that investments are expected at the location of this regional center over the coming period in terms of development of secondary selection, mechanical and biological treatment of waste, as well as other types of physical and chemical treatments, which will lead to an increase in the operational cost of this regional center. This is a clear indication that the operational costs of this company will rise in the period to come, which must be reflected in the level of prices for the services of collection, treatment and disposal of waste. This is even yet another reason to develop and monitor the home composting process through the business model proposed.

7.1.2. Practical Implementation of Home Composting in the Municipality of Bachki Petrovac

The municipality of Bachki Petrovac in Serbia was one of the local self-governments that was selected for piloting the Home Composting process under the "Business Cases for Improved Waste Collection and Valorization" project, in cooperation with GIZ DKTI Waste. GIZ DKTI Waste and SeSWA (Serbian Solid Waste Association), as partner organizations of the project, provided the support by a solid waste management expert (advisor) to guide the municipality through the process.

Supported by the advisor for implementation of the home composting process, the municipality of Bachki Petrovac prepared a questionnaire to evaluate the willingness and number of households interested in the implementation of home composting. The municipality organized a media promotion and a survey of citizens to apply for participation in the project, and developed and printed promotional material (flyers). Based on the survey conducted and the necessary data collected, a total of 170 households interested in home composting applied. The working group defined the optimal ratio and the model of composters and developed a specification. The agreement was to select a local producer for procurement of composters. Following the consultations, 170 composters were procured and distributed to households and one school. A promotional event was organized for the public distribution of home composters. The home composting process is monitored by the members of the municipal working group.

Monitoring and Evaluation

The process was implemented in the municipality of Bachki Petrovac in an organized manner. The estimate of the fullness of the composters monitored included a relatively large monitoring sample of 73 installed composters (52%). The results show a significant shift as compared to the original state, especially considering that, due to the time of implementation of the process, the aerobic degradation had already begun, resulting in considerable deposition of biodegradable waste.

Based on the submitted data for the mentioned period, it may be concluded that 4.94% (36 tons) of biodegradable waste is directed to home composting as compared to the generated amount of waste that could have been directed to home composting for the six months observed. The key indicators, which included the direct costs of waste collection and transportation, as well as the costs of disposal to the existing municipal landfill, indicate savings of approximately 5% of the stated real costs for a period of six months.

Based on the information provided, this municipality has the greatest potential for further introduction of the home composting process. Home composting can be introduced in as many as 96% of the households, or the introduction of the process would be justified in the case of 5,304 households. The municipality of Bachki Petrovac undeniably has the smallest population and surface area compared to the other local communities involved in the project, making the collection and transportation costs also the lowest. In addition to organizing the primary selection of recyclable waste components, the municipality also disposes of waste at the existing local landfill/dump site the disposal costs for which are low.

The stated direct costs of waste collection and disposal, which can be redirected to home composting amount to EUR 18,965 on an annual basis, which directly indicates that further and full implementation of the process can result in business savings in this amount.

It is worth noting that significant changes are expected in the coming period, as this municipality will be included in the Novi Sad Waste Management Region, which will significantly change the amount of these costs. Bearing in mind the great potential for introducing home composting, the implementation of this process on the entire territory will create even more significant savings in the future regional concept, which should continue to be monitored in accordance with the business model proposed.

7.1.3. *Practical Implementation of Home Composting in the City of Zenica*

The city of Zenica in Bosnia and Herzegovina was one of the local self-governments that applied and was selected for piloting the Home Composting process under the "Business Cases for Improved Waste Collection and Valorization" project. By applying for the piloting, the city of Zenica clearly expressed its commitment and political will to implement the process. BasWA (Bosnian Solid Waste Association), as a partner organization of the Project, delegated a solid waste management expert (advisor) to guide the municipality through the process.

The utility company organized a media promotion and a survey of citizens on their willingness to apply for participation in the project, and developed and printed promotional material (flyers). 48 composters were distributed to households.

Monitoring and Evaluation

The city of Zenica has the largest population compared to the other two local communities that participated in the project. The company "ALBA Zenica" d.o.o. is engaged in separate collection of waste (recyclables) and in collection of mixed municipal waste. The company also composts biodegradable waste collected from public areas. The city is part of the regional system and the municipal waste is finally deposited at the regional landfill "Moshcanica" in Zenica. The introduction of the process in this city started later than in the other two local communities involved in the project. For this reason, the fullness rate of the composters was lower (39%). Based on the submitted data for the stated monitoring period, it can be concluded that 7.5 tons of biodegradable waste was directed to home composting. The key indicators, which included the direct costs of waste collection and transportation, as well as the costs of disposal to the existing regional landfill, indicate savings of 0.3% of the stated real costs for a period of six months.

Based on the information provided, the city can introduce home composting in 21% of households; in other words, the introduction of the process would be justified in the case of 8,140 households.

The data submitted regarding the costs of municipal waste collection and transportation, as well as its disposal, provide a fair picture, depicting the real amount of costs incurred by waste management under the regional concept. The city has the lowest potential in terms of the total percentage of households that can be included in the home composting process; on the other hand, however, the projected waste volumes (5,062 tons/year) that can be composted in this way cannot be neglected. The direct cost of collecting and disposing of waste, which can be redirected to home composting amounts to EUR 298,759 on an annual level, which directly indicates that further and full implementation of the process can result in significant business savings in this amount.

This is particularly significant from the point of view of the real high costs of collection and transport as well as disposal in the described regional system.

8. QUALIFICATION OF THE NECCESARY ADVISORS

1) An SWM expert with a university degree in environmental engineering sciences (PhD is an asset), solid waste management, engineering or related disciplines. The expert shall have a minimum of 5 years' experience in waste management in developing and transition countries, with an emphasis on Serbia, North Macedonia and Bosnia and Herzegovina.
2) Experience in conducting measures related to composting at local level
3) Experience in providing consultancy and advisory services, including capacity development measures
4) Involvement in the development of waste management plans, regional as well as local, waste management modelling and option analysis.
5) Experience in policy support for waste management development in the last three years.
6) Experience in computerized environment; MS Office is a must.
7) Excellent knowledge of the Serbian and English language.
8) Strong organizational, interpersonal, moderation, facilitation, communication and networking skills.

This model has been developed by the "Business Cases Development for Improved Waste Collection and Valorization" Project, implemented by the GIZ Open Regional Fund for Southeast Europe - Modernization of Municipal Services, commissioned by the German Federal Ministry for Economic Cooperation and Development (BMZ). The Project was implemented in Western Balkan partner economies, in the period October 2017-October 2019, in partnership with the Serbian Solid Waste Association (SeSWA) and the Network of Associations of Local Authorities of South East Europe (NALAS).

9. ANNEX 1 Questionnaire for Citizens to Determine their Interest in and Readiness for Participation in the Home Composting Project

Questionnaire for Citizens
to Determine their Interest in and Readiness for
Participation in the Home Composting Project

The "Home Composting of Organic Waste" project, implemented in cooperation with GIZ (German Organization for International Cooperation), aims to: improve the state of the environment by reducing the amount of waste that is being disposed at landfills; facilitate the work of communal services; and improve the quality of life of households participating in the project.

The importance of home composting:

1. It reduces the amount of garbage deposited on landfills, thus prolonging the life of the landfill and reducing the environmental pollution levels;
2. It uses up all organic waste (plant waste) from your household that would otherwise end up in the garbage dump;
3. Good quality compost-soil is obtained that can be used as fertilizer for flowers, garden or lawn;
4. Such compost doesn't contain chemicals, heavy metals or hazardous materials, and is extremely suitable for growing vegetables;
5. When you have your own compost, you don't have to spend money on the soil for flowers and fertilizers.

Rights and obligations of the household:

- If you are interested in home composting and if your household is selected to participate in the project, you will get home composters in which you will be able to produce compost for your own needs;
- In addition to the composter, you will get an instruction manual and a brochure showing the way home composting is done in order to produce compost of good quality;
- It is your obligation to compost all organic waste generated in your household instead of dumping it in a garbage bin;
- It is your obligation to use all compost produced to improve your garden, lawn, flowers and the like and/or those of the households of your friends and relatives.

Are you interested in participating in a home composting project?

☐ **Yes** ☐ **No**

10. ANNEX 2 Monitoring Method – an Excel Table

The annex is provided in a separate MS Excel File:

Route Optimization - Annex 1 Monitoring Tool

11. ANNEX 3 Regional Working Group Inputs - Lessons Learned through Implementation

During the third meeting of the Regional Working Group on Solid Waste Management held in Belgrade on 21 November 2019, the main focus was placed on the discussion on and presentation of the activities, changes and benefits of the business process piloted. The applied interactive method World Café resulted in outputs regarding three aspects: applicability of the piloted process in other local contexts, possible improvements and way of dissemination of the project products. The content of this Annex is an added value to the ToR by bringing pragmatic reflection and recommendations on the process by experienced practitioners from the region.

Home Composting

World Café Outputs

Applicability of the process

The process of introduction of home composting could be beneficial and applicable both in rural areas (villages) and semi-urban areas (settlements with individual households). The inclusion of kinder gardens and schools is highly recommended.

In the urban areas, which are covered by organized green waste collection from the public spaces, central composting should be established. The process of home composting is not generating any profit for the PUC, but significantly contributes to cutting the waste collection costs and achieving savings in terms of landfill space. The process is applicable only in direct (door to door) communication with citizens in a selected area or a certain settlement. This is a precondition for implementation of process.

In some cases, the process can be adapted to "street" composting, provided that the common public spaces and human resources are available.

Process Improvement

A survey should be conducted among the citizens before the introduction of the process. Permanent education, raising awareness and promotion on local media are all required. The direct benefits for the citizens and the environment should be highlighted. It is recommended to start with dissemination of smaller number of home composters to selected households, and to then increase the quantity by involving more households step by step.

In order to ensure proper composting, user manuals need to be distributed together with the composters. Monitoring and evaluation of the process need to be established on a regular basis. At least one employee of the PUC needs to be fully dedicated to the coordination of the process. The additional duty is to provide detailed instructions for the citizens.

Demonstration of the process can be organized with the support of local schools.

Process Dissemination

An institutional framework needs to be set up. Home composting needs to be integrated into local waste management plans.

Neighboring municipalities should be informed about the process and advised on how to establish the process in their communities.

Furthermore, the process needs to be promoted at the regional level and integrated into regional waste management plans. Coordination of the activities should be established through Inter-municipal working groups. A legislative framework should be established at a national level. Home composting needs to be financed through the local budgets.